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Supplemental Notes on the Ecology of Odonate Larvae

By PHILIP P. CALVERT, Cheyney, Pennsylvania

I. KELLICOTT'S ODONATE NYMPH FROM A THERMAL SPRING

In the compilation [1] of a summary of physical, chemical and biological features of waters of the world in which Odonate larvae have been found, the late D. S. Kellicott's article,[2] bearing the title quoted above, was studied. In it are described four larvae "from a hot spring, forty-three miles west of Reno, Nev., in Lassen County, Cal." They were not identified farther than the "Family Libellulidae."

Although this article has been quoted by a number of authors,[3] it does not appear, from the literature, that the further identification of the larvae has been attempted. A final note to Kellicott's article, states that "The type specimens are preserved in the Museum of the Cincinnati Society of Natural History, being entered in the Accession Catalogue as Nos. 9315 and 9316. J. L." [Probably Dr. Joshua Lindahl, who sent the larvae to Kellicott, as mentioned in the first line of the article, and who was director of the Museum at Cincinnati 1895–1906, according to Who Was Who in America 1: 731, 1943.] In reply to an inquiry as to the existence of these specimens, Mr. Ralph Dury,

[1] Limnological Society of America, Research in progress by members, List 1, May, 1944. Mimeographed, p. 1.

[2] Journ. Cincinnati Soc. Nat. Hist. 19 (2): 63–65, 2 figs., March 24, 1897.

[3] *E.g.*, Abstract in Journ. R. Micr. Soc. Lond. 1897: 280. Issel, R. Atti Soc. Ligustica Sci. Nat. geog. (Genova) 17: 6–8, 1906. Tillyard, R. J. Biology of Dragonflies, Cambridge, Engld.: 367, 1917. Brues, C. T. Proc. Amer. Acad. Arts & Sci. 59 (15): 411, Nov. 1924.

Director of the Cincinnati Museum of Natural History, wrote to me, on September 5, 1944: "I have been with the Museum for 26 years and have gone over all the collections in that time. I have not found the specimens in question. Most of our alcoholic specimens were dried up when I became director."

Erythemis simplicicollis (known also as *Mesothemis simplicicollis*) has been reported as associated with, or in, warm to hot water in the Western United States.[4] The records naturally suggested the idea that Kellicott's larvae might be *simplicicollis* and a comparison of his description with known exuviae and larvae of this species supports this identification. The dimensions given by Kellicott are larger than those of my alcoholic larvae, but not larger than those given by Needham [5] and by Bick in his recent study of the life history of this dragonfly.[6] Kellicott says that the "wing-covers reach the ninth abdominal ring." Garman [7] notes that this is the case in alcoholics, but that in older specimens the wing-cases reach to the middle of the seventh segment, which is the case in larvae from North Carolina and Pennsylvania which I examined; Bick [8] reports them as extending to the sixth abdominal segment in the last larval instar. The feature in Kellicott's description which is most characteristic for *simplicicollis* is: "the lower laterals [abdominal appendages] are broad, with stout decurved apex"; his only negative datum is: "upper margin of prothorax quite deeply bilobed," which I do not find in *simplicicollis*.

[4] Kennedy, Proc. U. S. Nat. Mus. 52 (2192): 600–601, 623, 1917, near Calistoga, Napa County, California, and Golconda, Nevada. Brues, C. T. Proc. Amer. Acad. Arts & Sci. 63 (4): 170, 1928, nymphs at Hot Springs, New Mexico, Convict Lake, California and Denio, Oregon. Op. cit. 67 (7): 234, 1932, Yellowstone Park, five localities in Nevada and Hansen, California. The range of water temperatures for this species as measured by Brues is 30.8°–43.0° C. Notice also his interesting remark: "Nymphs of the widespread *Mesothemis simplicicollis* invade water of 43°, which seems to be the highest record not open to suspicion for any dragonfly." IV Internat. Congr. Ent. 2: 239, 1929.

[5] Bull. N. Y. St. Mus. 47: 527, 1901.

[6] Annals Ent. Soc. Amer. 34 (1): 220, 1941.

[7] Bull. Conn. St. Geol. & Nat. Hist. Surv. 39: 265, 1927.

[8] Annals Ent. Soc. Amer. 34 (1): 227, 1941.

Kellicott's description, as far as it goes, runs to *Erythemis* in the recent keys to larvae by Byers,[9] Needham & Fisher,[10] and Wright & Petersen.[11]

It is possible that Kellicott's larvae may have been *collocata* Hagen, placed as a subspecies of *simplicicollis* Say by Calvert,[12] Ris,[13] and Whitehouse,[14] but which Williamson,[15] Kennedy,[16] and Walker[17] regarded as a distinct species, all these opinions being based on imaginal characters only. I am not aware that any attempt to distinguish *simplicicollis* from *collocata* larvae has appeared in print.

II. Professor Pearse's Odonata from Beaufort, North Carolina

In 1936 Prof. A. S. Pearse published a paper on the Estuarine Animals at Beaufort, North Carolina.[18] For the identification of the Odonata included therein I am responsible. On comparing the list of species which I furnished to Prof. Pearse with his printed text, I find that the latter has indicated "nymph" for only one species, *Anax junius* (p. 200). After deducting two duplications (*Agrion maculatum* Beauvois for *Calopteryx maculata* Beauvois and *Pachydiplax longipennis*, entered twice) and *Anthax* [sic] *sinuosa* Wied. [*Anthrax sinuosa* Wied.?, a Bombyliid fly], not an Odonate, and adding one species, *Tramea carolina* or *T. lacerata*, omitted from his paper, there remain 20 other Odonata. According to my memoranda, only the following 7 species, in the sequence of his list, were represented by larvae examined by me:

[9] Ent. News 47: 60–64, 1936.
[10] Trans. Amer. Ent. Soc. 62: 113–114, 1935.
[11] Ohio Jour. Sci. 44 (4): 151–166, 1944.
[12] Biol. Centr.-Amer. Neur.: 332, 1907; 409, 1908.
[13] Coll. Zool. Selys-Longch. 13: 600, 1911.
[14] Amer. Midl. Nat. 26 (3): 544, 1941.
[15] Misc. Publ. Univ. Mich. Mus. Zool. 11: 10, 1923.
[16] Ibid.: 21.
[17] Bull. Provinc. Mus. Nat. Hist. Victoria, Brit. Col.: 13, 1927.
[18] Jour. Elisha Mitchell Sci. Soc. 52 (2): 174–222.

**Ischnura posita* (Hagen), Open Ground Ditch, June 20, July 2.

**I. ramburii* (Selys), Mullet Pond, April 30, July 11.

**I. verticalis* (Say), Open Ground Ditch, June 20.

**Erythemis simplicicollis* (Say), Mullet Pond, April 30, June 18.

**Pachydiplax longipennis* (Burm), Mullet Pond, April 30; Open Ground Ditch, June 20.

Tramea (*Trapezostigma*) *carolina* or *T. lacerata,* Core Creek, July 20.

Coryphaeschna ingens (Ramb.), Carteret Lodge Pond, June 20. Locality omitted in the printed list.

With *Anax junius,* mentioned above, this gives 8 species.

Species starred here were represented also by imagos, seen by me. Twelve of Prof. Pearse's species were represented by imagos only and these are in my memoranda. The first of his list, "*Enallagma* sp., juv.," is not in my memoranda.

Summing up the Beaufort list in another way: imagos taken 17 spp., larvae taken (including *Enallagma*) 9? spp., both imagos and larvae 5 spp.

I have thought it worth while to separate these records of larval and imaginal occurrence, while the data are accessible, because one is not justified in assuming that the presence of imago dragonflies at a given body of water indicates that their corresponding larvae live in the same body of water. The larvae, to be sure, *may* exist there, but they are more difficult to find and until they are found the assumption is not proof. This has been emphasized in different ways by the writer,[19] Geijske,[20] Geissbühler,[21] and doubtless others.

Consider, in this connection, the case of Walnut Lake, Michigan, as reported by Hankinson [22] and by Needham.[23] Hankin-

[19] Proc. Acad. Nat. Sci. Phila. 1908: 460.

[20] Tijdschrift v. Ent. 78 (3/4): 266, 1935.

[21] Mitt. Thurgau. Naturf. Ges. 31: 34–35, 1938. I shall be glad to receive additional references on this topic. P. P. C.

[22] Rept. State Board Geol. Surv. Mich. 1907: 233–234, 1908.

[23] Ibid., 263–265.

son writes: "While adults of many species of these graceful and showy insects [Odonata] were numerous about the margins of the lake, larvae were never found abundant. The few specimens of the latter collected came chiefly from the muddy bottoms in shallow water, as at stations 7 and 41. The larvae, however, were often found in the stomachs of rock bass and blue-spotted sunfish, less frequently in those of the common sunfish."

Needham, listing the Odonata of this same survey, enumerates 34 species of imagos and perhaps 17 species of larvae or exuviae. The proportions of imago-species to larva-species here is very nearly the same as in the Beaufort list, 2:1.

Neopaniasis, New Name for Paniasis Druce 1890 (Lepidoptera)

By William F. Rapp, Jr.

Recently the author found that *Paniasis* Druce (Proc. Zool. Soc. London, 1890, p. 500) is a homonym of *Paniasis* Champion (Biol. Centr. Amer., Zool., Col., vol. 4 (pt. 1), p. 208, 1886). Therefore, the new name *Neopaniasis* is proposed to replace *Paniasis* Druce, 1890. When Druce erected this genus on a new species *aleoptera,* he placed it in the family Melameridae, which is now included in the family Dioptidae. However, in a personal communication from Mr. Hahn W. Capps of the Division of Insect Identification, U. S. Department of Agriculture, the author learned that the species *aleoptera* is not a dioptid, but a Geometrid.

Type: *Eupaniasis aleoptera* (Druce).

Type Locality: Interior of Colombia.

At present there are two species included in this genus. The type and *E. tritoniaria* (Schause) which was originally placed in the genus Melanchroia by Dr. Schause.

I wish to acknowledge my indebtedness to Mr. Hahn W. Capps for the great amount of help he has given me.

Notes on the Behavior of Certain Ants *

By PHIL RAU, Kirkwood, Mo.

Camponotus herculeanus subsp. *pennsylvanicus* DeGeer. I was amazed to see several ants of this species carry away piecemeal, several newly dead black widow spiders, *Latrodectus mactans,* which I had thrown out of the window. These spiders are regarded as poisonous, and one wonders what effect they might have on the young ants when used as food. An undetermined red ant was likewise carrying away bits of this plunder.

This ant also likes to attack living cockroaches, and once a cockroach trap in the laboratory with several *Blatta orientalis* unintentionally served as bait for the ants and caught about fifty of them. This seemed to be a natural experiment in the power of communication in ants, or the lack of it, for obviously, when an ant became prisoner, it could not communicate the whereabouts of food stores to its companions at home. Therefore, one can safely conclude that the fifty odd ants so caught found and entered the trap by means other than that of communication, perhaps that of odor.

Some years ago I recorded (Trans. Acad. Sci., St. Louis, 28: 207–215, 1934) the war-like behavior of these ants to members of their own species, but probably from rival colonies. The war took place on the floor of my laboratory, July 10, 1926. This "civil-war" behavior probably occurs frequently among members of this species, for the identical behavior was again observed on the cement walk under the window of the same laboratory on August 21, 1943.

Camponotus castaneus Latr. About a dozen winged ants of this species were taken at the lights at Kirkwood, October 26, 1940.

Formica fusca var. *subserica* Say. Among the various items of food of this omnivorous ant are ants of other species. On May 23, 1935, I found an ant of this species making off with a living

* All of the ants mentioned in this paper were kindly identified by Mr. M. R. Smith.

ant of the species *Lasius umbratus mixtus* var. *aphidicola* Walsh, which in turn had in its own mouth a living *Lasius niger* var. *americana* Emery ant. Other insects are also carried into the nest. I once saw several ants in concerted action drag into the nest a dead housefly. They also like to store seed-pods of the American Elm. Every year in early May there is a veritable shower of seed-pods in our yard, and thousands of ants may then be seen conspicuously transporting them to the nests.

Lasius (*Acanthomyops*) *claviger* Roger. Several winged ants of this species taken at the lights at Kirkwood, Mo., July 21, 1934.

Prenolepsis imparis var. *testacea* Emery. A hundred or more of these ants were shaken out of a fungus plant, *Russula* sp. at Ranken, Missouri, on September 24, 1934. The ants entered the cap by two small openings in the hollow stem, which they themselves evidently had made.

Prenolepsis imparis Say. A winged queen of this species was seen at Kirkwood, April 30, 1940, and also a dozen winged individuals were picked off the automobile windows at Ranken, Missouri, April 6, 1941.

Tetramorium cespitum L. Hundreds and hundreds of piles which looked very much like very fine coffee grounds were observed in a fifty acre plot in the central part of St. Louis. Close inspection proved them to be piles of dead ants, which later were identified by Mr. M. R. Smith as *T. cespitum*. The ants had evidently died in the nests during the winter and were later carried out by the workers. Portions of this field are used as a neighborhood dumping ground, and many piles of the dead ants were found on top of pieces of rusty tin or other refuse, but most of them were found on small patches of barren ground, with, however, a sprinkling in the short grass. There were from 500 to 1200 dead ants in each pile, and the number of piles was enormous—far beyond my ability to even estimate them. I never before saw so many ants in any one place. I am at a loss to offer an explanation for this enormous mortality. The date when the observations were made is June 20, 1939.

Leptothorax curvispinosus Mayr. A nest of this ant containing only larvae was found in a hollow stem of the trumpet-vine at Kirkwood, Missouri, May 12, 1935.

Pogonomyrmex occidentalis Cress. The most conspicuous objects of the landscape in the semi-arid regions of Kansas are the large gravel covered mounds of the harvester ant, *P. occidentalis*. In motoring through the state, the temptation is great to stop sufficiently long to study the habits of this ant. However, only a few desultory notes were made at a few points—near Kanopolis, Dodge City and Salina.

The mounds are large, they appear to be abundant, and are usually made up of small bits of gravel; a large space around each nest is always clean and is kept clear of vegetation. It was at first thought that the gravel was brought from below in the course of mining operations, but close observation proved that the ants picked up the bits from the surface elsewhere and deposited them on the mound. The gravel seemed to be of a very uniform size, and this was probably due to the fact that an ant brought in only such bits as she could conveniently carry. They not only brought in gravel, but in one mound they were seen bringing in shiny bits of broken glass, and in a nest in the yard of a schoolhouse, they were bringing in bits of black coal which they picked up in the shed twenty feet away.

In one mound, when I scratched away the surface on July 5, 1942, I found many winged ants. In a nest later, I found several ants carrying out the shedding skins of an unknown larval insect.

While *P. occidentalis* are regarded as harvesters, I found several of them bringing in insects, two of which were identified as the adult beetle, *Calendra parvulus* Gyle (det. L. L. Buchannan), and the adult wasp, *Lyroda subita* Say (det. H. K. Townes).

Pogonomyrmex barbatus var. *molefaciens* Buckley. Ants of this species are found in the same regions of Kansas as *P. occidentalis*, but the nests are not quite so abundant, at least not

along the highway. Their mounds are also composed of tiny bits of gravel. Neither are the mounds so conical, being much flatter than those of *P. occidentalis.* These ants and their mounds were also seen along the highway on a trip to Mexico in July 1940. At Waco, Texas, some were seen carrying out soil from a nest, while others were carrying in small seeds of grass.

At McAlaster, Oklahoma, winged adults would often come to the openings of the nests but never flew into the air; a few days later, however (July 11, 1940), at Iguala, Gro., Mexico, winged individuals were often seen in flight. The ground around these nests is almost always clean and barren, but at Teothuacan, Mexico, there were very distinct runways in the grass around the nests.

This ant is a desert loving creature, and the mounds were abundant in the desert country of Mexico along the highway from Renosa to Monterey.

Crematogaster laeviuscula var. *clara* Mayr. An old mud-dauber's nest harbored a colony of this ant at Corliss, Kansas. The nest was on a shelf in a small, very dark out-building, and when taken on July 4, 1942, had about 250 adults and larvae plus only a few pupae. There were no eggs. According to Wheeler (Ants, p. 209, 1910), these ants often occupy old woody galls on oaks.

This species also abounds on my premises at Kirkwood and one summer caused me much annoyance by destroying the larvae of Polistes wasps in unguarded orphan nests, upon which I was carrying out experiments.

Solenopsis molesta Say. Three newly dead mining bees, *Anthophora abrupta,* at the foot of a clay bank at Kirkwood, were entirely covered with hundreds of this tiny thief ant on June 12, 1935.

Monomorium minimum Buckley. Many of these ants came to the saucers of honey I had placed in the grass for bees in the latter part of June.

Biological Notes on Atypus Bicolor Lucas (Arachnida) *

By MARTIN H. and KATHARINE E. MUMA

Tarantulas of the genus *Atypus* Latreille are known commonly as purseweb spiders. Several workers including F. Enock,[1] H. C. McCook[2] and M. Ehlers[3] have studied the habits of different members of the genus. However, a search of literature showed that there was no published information on the biology of *Atypus bicolor* Lucas, a species living on the eastern sea coast of the United States. The following notes on this species have been collected during the past several years through observation and experimentation on three colonies located at College Park and Berwyn, Maryland. Thirty-three webs were located and utilized during the study.

The Web. This tarantula builds a leathery, tubular web placed nearly upright or perpendicular against a tree, stone or bank. Occasionally the web is suspended from a clump of tall grass or weeds. About sixty percent of the length of the tube is situated below the surface of the ground. Webs of adult females measure one to one and one-quarter inches in diameter and vary from fifteen to twenty inches in length. All of the webs located in this study were in low, more or less sandy, situations. Seventy percent of the webs studied had a southern exposure. No other striking preference for placement of the web was noted.

In building the web the spider first builds a short, horizontal, irregular tube on the surface of the ground. Working from the inside of this web she then builds a small section of the upright aerial portion of the typical tube. Next she begins excavating and building the subterranean part of the web. Soil excavated is formed into pellets a quarter of an inch in diameter which are carried by the spider in her front legs up into the aerial part of the web and pushed out through a slit that is almost always present near the top. The spider by-passes obstacles such as roots or stones encountered during excavation by extending the

* Contribution No. 1968 of the Maryland Agricultural Experiment Station. Miscellaneous Periodical No. 33. (Department of Entomology.)

web laterally for a short distance before continuing downward. Working alternately on the upper and lower portions the spider continues building until the web is complete. Under natural conditions particles of soil and bits of debris are incorporated with the web causing its color to blend with that of the tree or bank by which it is supported. In white sand under laboratory conditions particles of sand were used. Single strands of silk attach the web to the support. Webs are constantly under repair during the summer months. With the exception of the natural opening near the top of the web all holes or slits are patched with a fresh layer of silk. Patches often do not contain the foreign matter incorporated in the original web. When the aerial part of the web is torn down by wind, rain or other forces the spider rebuilds by cutting through one side of the old web at ground level and spinning a new upright. Webs in the field often exhibit two or three tabs of old web. In the laboratory, webs that did not reach to the bottom of holes provided in plaster molds were extended to do so.

The Egg and Young. Eggs were found in only one instance. They were in a spherical, loosely spun egg case suspended on the inside, near the bottom, of a web taken on June 30, 1942. The eggs remained in good condition until August 1 when they began to decompose. As young have been found in the webs in the late fall it is probable that eggs laid in the summer do not hatch until early fall. The eggs were spherical, about one-eighth of an inch in diameter, and pale yellow in color. The case contained approximately two hundred eggs.

Five tubes collected in the early winter contained newly hatched spiderlings. In each case the spiderlings were clustered around the mother on the inside walls at the base of the tube. Counts were made on two of the groups of spiderlings; one totalled 163, the other 278. Under laboratory conditions the young emerge from the webs at or near the top, climb upward "following the leader" and develop heavy bands and threads of silk with their drag lines. Dispersal is accomplished by the young spiders ballooning on strands of silk. Emergence

of spiderlings from each of two confined webs took place on two separate occasions; part of them leaving in January, the remainder in February. Under natural conditions the silken trails have been observed late in March and early in April. All attempts at rearing the newly hatched spiderlings were unsuccessful. On one occasion tubes a half inch in length were built by three spiderlings before they died. Although diligent search has been made none of these tiny webs has been located in the field. The smallest web seen under natural conditions was a quarter of an inch in diameter, and the aerial part measured two inches in length.

The Adult Female. In the field the female apparently spends her entire life within the web. At no time during the study, day or night, was a female observed outside of the web. The longevity of these spiders was not determined in this study. However, since webs of adult females have been kept under observation for three years, it seems likely that the life cycle is of considerable length. Laboratory observations were made on seven mature females. Two of the confined females were removed from their webs for study. The remaining five were left in the tubes and used for observation and test purposes.

Mature females are reluctant to leave the web, clinging to it even while feigning death. After removal the spider continues to "play 'possum" if not disturbed and often remains quiescent for several minutes. If irritated by tapping with a teasing needle or similar object the spider will attempt to avoid trouble by moving away. The walking gait is clumsy, due apparently to the short legs, heavy body and unaccustomed horizontal position. Repeated tapping or prodding is necessary to induce the spider to bite. The bite, or more correctly strike, is accomplished with lightning speed. On the first strike the fangs are clamped tightly around the teasing instrument for several seconds. Succeeding strikes by the same individual are not as swift and release of the instrument is immediate. As this tarantula is sedentary, remaining within its web at all times, and as it is reluctant to bite outside of the web no attempt was made to determine the toxicity of its venom.

Inside the web the female remains at or just below the surface of the ground while waiting for prey. At the first sign of an approaching meal she stalks cautiously into the aerial part of the tube. In this advance she faces outward away from the support and in a position to strike. Signal of the presence of prospective food seems in some cases to be telegraphed by the support lines or guys that extend an inch or more from the tube on each side. When the prey climbs over the surface of the tube the spider makes a final rush, striking through the web. She then pulls the prey into the web, repairs the damage and retires below the surface of the ground to eat. After feeding she takes the remains of her prey to the top of the web and fastens it there. An analysis of these remains shows the spider to be a general feeder on ground inhabiting fauna. In collections from five different webs in the late summer, parts of ground beetles (Coleoptera), crickets and cockroaches (Orthoptera), true bugs (Hemiptera) and millepedes (Diplopoda) were found. Fecal matter is ejected through the opening at the top of the web with force enough to carry it three to four inches. The spider is well adapted to its precarious existence since it can survive starvation periods of one to two months.

The cocoon of a large hymenopterous parasite was taken from one web. An attempt to rear the insect failed due, it is believed, to the inability to maintain proper humidity.

Three females retained in their webs moulted after producing eggs and young.

The Male. Traps were set and many hours of search were made but no males were found. As males of this species have been found wandering in the open by other workers it appears that young males, upon moulting to maturity, leave their webs in search of females with whom to mate.

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Undescribed Species of Crane-Flies from the Western United States and Canada (Dipt.: Tipulidae). Part III

By CHARLES P. ALEXANDER, Massachusetts State College, Amherst, Massachusetts

The preceding part under the above title was published in ENTOMOLOGICAL NEWS, **54**: 253–258; 1943. At this time I wish to define three further species of the genus *Tipula* Linnaeus from Idaho, Washington and California, based on materials taken by Dr. A. L. Melander and by Mr. Anthony Downs. Except where indicated to the contrary in the text, the types of the novelties are preserved in my collection of Tipulidae. I am very deeply indebted to both collectors for their kindness in permitting me to examine large series of these flies in their possession.

Tipula (Bellardina) sacajawea n. sp.

Belongs to the *subcinerea* group; male hypopygium with the arm of the basistyle uniformly yellow, including the denticles; outer dististyle narrow, the apical yellow setae relatively long; inner dististyle only moderately dilated, at its apex with a group of at least twenty large blackened spines.

♂. Length about 16–17 mm.; wing 19–20 mm.; antenna about 3.4–3.5 mm.

Frontal prolongation of head dark brown, gray pruinose above; nasus elongate; palpi dark brown, the third segment a trifle paler. Antennae with scape and pedicel brownish yellow, flagellum dark brown; verticils long and conspicuous. Head light gray, patterned with dark brown, including a cen-

tral vitta on vertex and more or less distinct lateral lines bordering the gray posterior orbits, the whole darkening more or less interconnected to form a trident.

Pronotum gray, with three brown spots. Mesonotal praescutum conspicuously patterned with light brown, black and gray, the disk chiefly occupied by light brown and gray stripes with broad brownish black centers; ground color of interspaces brownish black, more pruinose near suture; intermediate black stripes narrow, their pale lateral borders broader, the narrow median vitta gray pruinose; lateral stripes brownish gray with black centers; humeral and lateral portions of praescutum light gray pruinose; posterior sclerites of notum gray, patterned with dark brown, including areas on scutal lobes, a capillary dark line on scutellum, and three darkenings on mediotergite. Pleura and pleurotergite gray, with a very conspicuous dark brown dorsal stripe extending from the cervical region across the propleura and bases of fore coxae, the broad anepisternum to the wing-root, slightly involving the dorsal pteropleurite; a smaller dark spot on dorsal sternopleurite; metapleura chiefly pale yellow. Halteres black, the base of stem restrictedly yellow, with a small black spot on membrane at its base. Legs with coxae light gray, the bases of the fore and hind pairs narrowly infuscated; trochanters brown, light gray pruinose; femora and tibiae fulvous, the tips narrowly blackened, especially on the latter; basitarsi passing into black; claws (male) with a small obtuse tooth. Wings relatively narrow, heavily patterned with light and darker brown on a cream-colored ground; the dark pattern exceeds in area the pale markings except on proximal third of wing; the darkest pattern includes the stigma with a confluent seam over the cord and smaller spots beyond arculus and over origin of *Rs;* dark marginal spots at ends of outer veins, alternating with cream-colored marginal spots in the centers of the cells; the paler brown pattern involves most of the remaining cells, alternating with ground areas of about the same size; veins brown, paler in the more yellowed costal field. Venation: *Rs* a little more than twice *m-cu; R_{1+2}* entire; cell 1st M_2 relatively small, narrowed at outer end; *m-cu* on M_4 shortly beyond base.

Abdomen with basal tergite dark brown, bordered by light gray; succeeding tergites broadly orange medially, with conspicuous brown sublateral stripes, the lateral borders broadly gray, widest on the more proximal sclerites, the posterior margins more narrowly pale; sternites obscure fulvous, more or less pruinose, especially on the basal segment, the outer segments with broad paler margins; hypopygium chiefly brownish black, the lobe of the basistyle and the outer dististyle paler. Male hypopygium with the caudal margin of the ninth tergite subtransverse, the rounded median lobe small and dark; sublateral points small, conical. Basistyle produced caudad into a long arm, as in the group, this provided with a few teeth or points on the mesal face. Outer dististyle a little shorter than the arm of the basistyle, relatively narrow, the greatest width not exceeding one-fourth the length, at its tip with a few long yellow setae. Inner dististyle only moderately dilated as compared with allied forms; apex with a group of at least twenty conspicuous blackened spinous points.

Holotype: ♂; Moscow Mountain, Idaho, June 26, 1920 (Melander); in Melander Collection. *Paratopotypes:* 4 ♂♂, June 24, 1919; June 26, 1920 (Melander). Dr. Melander has supplied me with detailed notes on the type locality, of which the following is a digest. "Moscow Mountain, altitude about 4500 feet, is indicated on the maps as 'Cedar Mountain of the Thatuna Hills.' The north side is cool, with large cedar trees on the slope, toward the top the vegetation becoming dense, including mountain ash and alder, with patches of *Veratrum*. A favorite collecting ground of the entomologists from Pullman, Washington, and Moscow, Idaho, including Aldrich and Melander."

Named for *Sacajawea,* "The Bird Woman," Shoshone Indian, wife of the French trader Charbonneau, who, in 1805–1806, guided Lewis and Clark across the Rockies and beyond to the Pacific Ocean. Her papoose, Baptiste Charbonneau, was born on the expedition, February 11, 1805. Sacajawea died on April 9, 1884, at the age of nearly 100 years and is buried in the Shoshone Reservation cemetery near Fort Washakie, in the eastern foothills of the Wind River Range, Wyoming.

The species is well distinguished from the other members of the group, *T.* (*B.*) *subcinerea* Doane and *T.* (*B.*) *rastristyla* n. sp., by the hypopygial structure, as above described. In *subcinerea,* the median tergal lobe is yellow and conspicuous, the arm of the basistyle provided with blackened teeth and long yellow setae, and the inner dististyle is unusually flattened and expanded, the apical spinous points so reduced in size as to be visible only under relatively high magnification.

Tipula (Bellardina) rastristyla n. sp.

♂. Length about 18 mm.; wing 20 mm.; antenna about 3.1 mm.

Characters generally as in *sacajawea* n. sp., as described.

Frontal prolongation of head dark brown on either side, the middorsal line gray. Antennae relatively short. Posterior vertex with the median dark brown line but without lateral infuscations. Thoracic pattern virtually identical in both species. Wings a trifle wider, with cell *1st* M_2 larger, subequal in length to cell M_1.

Abdominal tergites with a very conspicuous yellow or orange-yellow median stripe, the sublateral portions dark brown or brownish black, the yellow becoming obsolete on tergite six; tergites seven to nine black, the eighth concealed beneath the seventh; lateral tergal borders broadly, the posterior margins very narrowly, grayish white; sternites chiefly obscure orange, gray pruinose, the outer segments more heavily pruinose and with yellow posterior borders, this coloration extending through segment eight; sternite nine uniformly blackened except for the lobe of the basistyle and the dististyles which are obscure yellow. Male hypopygium generally as in *sacajawea* but with all details quite distinct. Ninth tergite with the median region between the sublateral lobes more evidently emarginate; median tubercle conspicuous, low and broad, with abundant setae. Basistyle with the most proximal point a long fingerlike tubercle. Outer dististyle narrow, its width across midlength approximately one-fifth the total length; setae at apex unusually short and incon-

spicuous for a member of the *subcinerea* group, continued down the inner edge of style. Inner dististyle narrowed just beyond base, widely expanded outwardly, the spines large, black and very conspicuous, forming a compact group on the margin at the most expanded portion of the blade, about three of these spines larger and more powerful.

Holotype: ♂; Snoqualmie Pass, between King and Kittitas Counties, Washington, June 29, 1924 (Melander); Alexander Collection, through courtesy of Doctor Melander.

Tipula (Lunatipula) cladacantha n. sp.

Allied to *bifalcata;* general coloration of thorax yellow, the praescutal stripes scarcely defined; nasus lacking; antennae black, the scape, pedicel and most of the first flagellar segment yellow; male hypopygium with the beak of the inner dististyle obtuse; posterior spinous appendage stout, terminating in a long spine, with a second smaller spine a short distance back from the tip.

♂. Length about 17–18 mm.; wing 19–20 mm.; antenna about 5–5.2 mm.

Frontal prolongation of head light yellow, without nasus, the dorsal surface weakly pruinose; palpi with basal three segments yellow, terminal segment blackened. Antennae with scape, pedicel and proximal two-thirds of first flagellar segment yellow, the remainder of flagellum black; segments moderately incised, a little exceeding their longest verticils. Head above yellow, sparsely pruinose, with a capillary dark median vitta.

Thorax chiefly yellow, the praescutal stripes ill-defined, somewhat clearer yellow than the ground. Pleura yellow, very sparsely pruinose; dorsopleural membrane clearer yellow. Halteres with stem obscure yellow, clearer yellow at base, knob brownish black. Legs with coxae light yellow; remainder of legs yellow, the tips of the femora, tibiae and basitarsi narrowly infuscated; outer tarsal segments more darkened; claws (male) toothed. Wings with a strong yellowish brown tinge, clearer yellow on basal half, particularly in the prearcular and costal

fields; stigma very small and inconspicuous, pale brown; obliterative area before cord moderately conspicuous, especially across cell *1st* M_2, barely entering cell M_3; veins brown, more brownish yellow in the brightened fields. Venation: *Rs* somewhat less than twice *m-cu;* petiole of cell M_1 subequal to or a little exceeding *m*.

Abdomen yellow, clearest on the basal segments, becoming more obscure outwardly, on the outer segments with indications of a very slightly darker sublateral stripe; lateral borders and the very narrow posterior margins paler; hypopygium castaneous. Male hypopygium with the ninth tergite transverse, the dorsal surface with a deep median furrow; caudal margin with a narrow median notch, on either side of which is an obliquely truncated lobe, the latter more or less sclerotized but not blackened, the margin of the truncated edge microscopically crenulated. Ninth sternite with the appendage large, the convex upper portion with a dense fringe of long yellow setae, the lower end produced into a smaller lobule that bears a pencil of very long reddish setae. Basistyle entire, not produced. Outer dististyle expanded on more than the outer half, the latter more or less bent backward, as in *bifalcata.* Inner dististyle complex, the main body with the rostrum obtuse, the dorsal crest triangularly produced backward, the face of the crest above the beak with very conspicuous, parallel ribs; lower beak blackened, its tip narrowly obtuse to subacute; outer basal lobe a flattened foot-shaped lobe; at base of last with a still further arm, as in *bifalcata* and allied forms, this appearing as a flattened blade or rod, its tip extended into a long reddish spine, on outer margin before apex with a smaller similar spine; the entire arm but especially the outer margin and apex with very long yellow setae. Phallosome including two sets of paired blades, one pair short, terminating in small curved hooks, the second pair long and slender. Eighth sternite sheathing, the apical lobes separated from the body of sclerite by pale membrane; the lobes include elongate lateral structures, their inner margins fringed with long setae from strong tubercles, two near the apex very large and powerful, fasciculate, bent strongly mesad just beyond

their base, decussate at median line; a low depressed median cushion is similarly fringed with long yellow setae.

Holotype: ♂; Wawona, Mariposa County, California, altitude 5000 feet, June 6, 1939 (A. Downes). Paratopotypes, 4 ♂♂.

Although evidently allied to both *Tipula* (*Lunatipula*) *biarmata* Doane and *T.* (*L.*) *bifalcata* Doane by the structure of the male hypopygium, the present fly is well distinguished by the lack of the nasus and in various details of structure of the male hypopygium, particularly of the inner dististyle, as the obtuse beak and the very stout, branched posterior arm. The affinities of this particular group of flies remain somewhat obscure. The presence of a third lobe or spine on the inner dististyle, additional to the apparent outer basal lobe, sets these flies off as somewhat distinct. It should be noted that within this subgroup some species have the nasus whereas in the present fly it is quite lacking.

The Status of Stål's Oedipoda venusta, 1861 (Orthoptera, Acrididae, Oedipodinae)

By James A. G. Rehn, The Academy of Natural Sciences of Philadelphia

In 1861 the Swedish orthopterist Carl Stål described an oedipodid locust from San Francisco, California as *Oedipoda venusta.*[1] This species is a well-known form of the Pacific area, which has variously been referred to the genera *Spharagemon* and *Dissosteira,* but under present concepts properly should be placed in the latter. Unfortunately eight years earlier Fieber used the conbination *Oedipoda venusta* for a species then described by him from Greece,[2] and in consequence Stål's specific name is preoccupied and must fall. Both species have, of course, long been removed from the old blanket genus

[1] Kongl. Svenska Freg. Eugenics Resa, Zool. 5, p. 344.
[2] Lotos, III, p. 123, (1853).

Oedipoda, Fieber's species having been placed in *Scintharista* by Saussure in 1884, and finally in *Mioscirtus* by the same author in 1888.

The next name which is available for the Californian species is *Dissosteira pictipennis* Bruner, described from a single female said to have been taken in "California, probably in the vicinity of Indio." [3] The unique type of this species in the Hebard Collection ex Bruner is now before me. The differences given by Bruner in his key to the species of *Dissosteira* in the Biologia, to separate *pictipennis* from Stål's *venusta,* are seen to be of no value when a series of the species from a considerable number of localities is examined. With such a representation before me it can also be stated that Bruner's assumption that the type of *pictipennis* came from the Indio area is unwarranted.

The species for which the name *pictipennis* must be used is a coastal and west slope Sierran type, and it does not occur anywhere in the Colorado or Mohave Deserts, and definitely is not found about Indio, where I have collected Orthoptera on a number of occasions between 1907 and 1937. While *pictipennis* can be found in the west slope of the San Gorgonio Pass, but a few dozen miles west of Indio, it, and a number of other Orthoptera similarly distributed, most certainly does not inhabit the pronounced Colorado Desert environment about Indio. When the relatively small type specimen of *pictipennis* is compared with a series of some hundreds of individuals from over the entire known range of the species, it is found to agree fully in a number of local characteristics, of which size is one, with material taken in the Monterey peninsula area, and from correlated and confirmatory evidence of other material similarly labelled, and taken by the same collector (Leon La Forge), I feel that general region is the one in which the type of *pictipennis* was collected. The type specimen, while faded and bleached, still shows the characteristic rose colored disk of the wings.

[3] Biol. Cent.-Amer., Orth., II, pp. 162, 163, (1905).

Tempo and Mode in Evolution, by George Gaylord Simpson, New York, Columbia University Press, 1944, pp. xviii, 237, $3.50. In recent years renewed interest has developed in the subject of evolution due at least in part to the development of a new subdivision of genetics, population genetics, which permits of an experimental attack in a field which heretofore has been largely based on logical deductions from observable facts. This new book represents a survey of these modern theories by a paleontologist. Accepting and applying the mathematical and experimental analyses of population genetics to paleontological data, the author finds that insofar as the data from the two fields can be compared paleontological history can be made consistent with interpretation by population genetics. Some of the book is speculative but the author distinguishes clearly between facts and interpretations and between probable truths and guesses. Unfortunately for the layman, the book seems to be a treatise for specialists. It presupposes considerable familiarity with scientific names, terms and thought. For ready reading it should be preceded by at least some knowledge of elementary statistics, paleontology, general zoology, genetics and population genetics. Of course a serious novice could read it with profit but it is not easy reading even for one fairly familiar with the subject.

The author discusses in sequence the rates of evolution, determinants, micro-, macro- and mega-evolution, low rate versus high rate lines, inertia, trends, momentum, the environment and finally modes. In his last chapter he summarizes his views on evolution through the ages:

"The same general forces are operative throughout the whole of evolution, and they bring about similar processes and sequences wherever and whenever they occur. Their predominance, balance, and interaction do, nevertheless, vary greatly, and quite different sorts of evolutionary patterns may result. These patterns are protean. Their seemingly infinite variety is so bewildering that generalization appears impossible at first. Yet through them all there run three major styles, the basic

modes of evolution." These modes he terms speciation, phyletic evolution and quantum evolution.

Speciation is given as the local differentiation of two or more groups *within* a more widespread population following means worked out by population genetics. Speciation is shifting, erratic, not typically either linear or adaptive, and is greatly influenced by the size of the interbreeding population (moderate, not large, size most favorable). Phyletic evolution is the term applied to slow, sustained, directional shifts of the average characters of an *entire* population. Phyletic evolution is highly adaptive and is represented by the common paleontological series (e.g. horses). Quantum evolution is the term applied to the relatively rapid shift of a population to one or more *new lines*. Quantum evolution involves loss of genetic equilibrium, a preadaptive shift and then establishment of an entirely new equilibrium. Paleontological evidence suggests that quantum evolution accounts for major changes (phyla, etc.) and that these occur rapidly; population genetics offers a possible mechanism. Each of these three modes may occur at any evolutionary level and may occur in combination but the tendency is for lower taxonomic categories (species, etc.) to arise by speciation, intermediate categories by phyletic evolution (genera, families, etc.), and higher categories by quantum evolution (phyla).

The evidence presented is cogent and the book one to be recommended as presenting material and ideas not available elsewhere. A. G. RICHARDS, JR.

Current Entomological Literature

COMPILED BY THE EDITORIAL STAFF.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of Journals given at the end of the literature. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).
Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—**Bethune-Baker, G. T.**—Obituary. [21] 57: 35–36. **Bridarolli, A.**—Excursion al Ignazu, Argentina. [101] 2: 50–62, ill. **Dallas, Ernesto D.**—Bibliografía del. [101] 2: 15–20. **Hincks, W. D.**—Problem of a changing nomenclature. [8] 71: 40–42. **Poulton, Edward Bagnall.**—Obituary. [Obit. Note. Fellows R. Soc. Lond.] 4: 655–80, bibl., port. **Stewart, M. A.**—Professional training in entomology. [55] 21: 1–10. **Wainwright, C. J.**—Nomenclature again (Diptera). [8] 71: 39–40. **Williams, C. B.**—An insect-catching grass. [9] 78: 37–38.

ANATOMY, PHYSIOLOGY, MEDICAL—**Andrewartha, H. G.**—Some differences in the physiology and ecology of locusts and grasshoppers. [22] 35: 379–89. **Autrum, H.**—Über kleinste Reize bei Sinnesorganen (Orthop.). [110] 63: 209–36 (1943). **Begg & Sang**—Time of action of the gene antennaless and its effect on the development of the cephalic index of Drosophila melanogaster. [33] 21: 1–4. **Blair, K. G.**—Notes on the economy of the rose gall formed by Rhodites (Hymen.). [107] 20: 26–31. **Butler, C. G.**—Influence of the various physical and biological factors of the environment on honeybee activity. An examination of the relationship between activity and nectar concentration and abundance. [33] 21: 5–12. **Collenette, C. L.**—Orientation experiments on larvae of Pieris brassicae. [9] 78: 33–36. **Danneel, R.**—Melaninbildende Fermente bei Drosophila melanogaster. [110] 63: 377–94 (1943). **Edney, E. B.**—Laboratory studies on the bionomics of the rat fleas, Xenopsylla braziliensis and X. cheopis. I Certain effects of light, temperature and humidity on the rate of development and the adult longevity. [22] 35: 399–416. Oxygen consumption of prepupae of Drosophila melanogaster in relation to the surface area of the puparium. [33] 21: 39–45. Empirical formulae and the surface area of puparia of Drosophila melanogaster. [42] 98: 23–34. **Ephrussi & Herold**—Studies of eye pigments of Drosophila. II Effect of temperature on the red and brown pigment in the mutant blood (w^{bl}). III The heterogeneity of the "red pigment" as revealed by the effects of the "white" alleles and by color changes during development. [Genetics] 30:

62–70. **Ewing, H. E.**—Trombiculid mites (chigger mites) and their relation to disease. [17] 30: 339–65, ill. **Eyles, E. D.**—"How does a fly land on the ceiling?" [107] 20: 14–15. **Falconer, D. S.**—On the behavior of wireworms of the genus Agriotes in relation to temperature. On the movement of wireworms on the surface of the soil and their sensitivity to light. [33] 21: 17–32; 33–38. **Goldschmidt, R., et al.**—A study of spontaneous mutation. [Univ. Cal. Publ. in Zool.] 49 (10): 291–550. **Henry, G. M.**—Reflex bleeding in Sathrophylla rugosa (Orthoptera). [Ceylon J. Sci.] B, 22: 187–88, ill. **Holst, E. von**—Untersuchungen über Flugbiophysik. I Messungen zur Aerodynamik kleiner schwingender Flügel. [110] 63: 289–326 (1943). **v. Jascke, P.**—Bemerkungen zum Bau der alokosternalen Cicindelinenelytren. [100] 141: 231–34, ill., 1943. **Kinder & Süffert**—Über den Feinbau schillernder Schmetterlingsschuppen vom Morpho-Typ. [110] 63: 268–88 (1943). **Kühn & Engelhardt**—Über zwei melanistische Mutationen (At und ni) von Ptychopoda seriata. [110] 63: 251–67 (1943). **MacGill, E. I.**—On the biology of Dysdercus howardi. III The effect of temperature and humidity on the life cycle. [22] 35: 301–08. **Ulrich, H.**—Über den Einfluss verschiedener, den Ernährungsgrad bestimmender Kulturbedingungen auf Entwicklungsgeschwindigkeit, Wachstum und Nachkommenschaft der lebendgebärenden Larven von Oligarces paradoxus (Cecid., Dipt.). [110] 63: 109–42 (1943). **Vargas, L.**—Accion del DDT sobre algunos arthropodos domesticos. [35] 5: 229–35. **Vogt, M.**—Zur Produktion und Bedeutung metamorphosefördernder Hormone während der Larvenentwicklung von Drosophila. [110] 63: 395–446 (1943). **Weiser, J.**—Zur Kenntnis der mikrosporidien aus Chironomiden Larven. II. [100] 141: 255–64, ill., 1943. **Williams, C. B.**—Notes on the fat contents of two British migrant moths. [107] 20: 6–13. **Wundsch, H. W.**—Metamorphose von Demeijerea rufipes (Tendip.). [100] 141: 27–32, ill., 1943.

ARACHNIDA AND MYRIOPODA—Ewing, H. E.—Two new trombiculid mite larvae (chiggers) from Burma. [10] 47: 63–65, ill. (See also under physiology.) **Hoff, C. C.**—New sp. and records of preudoscorpions from Arkansas. [89] 64: 34–57, ill. **Lundblad, O.**—Hydracarinenfauna Sudbrasiliens u. Paraguays. Teil 2–5. [K. Svens. Vet.-Akad. Handl.] (2) 20: nos. 2, 5, 8, 13, 1942–44 (k). **Newell, I. M.**—Status of Thalassarachne verrilli, halacarus

and copipognathus. [89] 64: 58–62. **Semans, F. M.**—Black widow spider distribution in Ohio. [43] 45: 28. **Williams, R. W.**—A bibliography pertaining to the mite family Trombidiidae. [119] 32: 699–712.

THE SMALLER ORDERS—Augustson, G. F.—New mouse flea, Pleochaetoides bullisi, from Texas. [17] 30: (k to larvae). **Williner, G. J.**—Un Psocotero critico. [101] 2: 41–44, ill. **Wygodzinsky, P.**—Contribuicao ao conhecimento da familia Campodeidae do Mexico. [102] 3: 367–404, ill. (*).

ORTHOPTERA—Andrewartha, H. G.—(See under physiology.) **Liebermann, J.**—Alotipo hembra de Neuquenia fictor (Cyrthacant.). [101] 2: 65–71, ill. Callonotacris caeruleipennis nuevo Romaleino del Brasil (Acrid.). [Acta Zool. Lilliana] 2: 247–53, ill. **Piran, A. A.**—Contribucion al conocimiento de los tettigonioideos de la Mesopotamia Argentina. II. [Acta Zool. Lilloana] 2: 5–7, ill. **Rehn, J. A. G.**—Three n. sps. of the reticulosa group of the blattid gen. Cariblatta. [Notulae Nat.] no. 149, 15 pp., ill. New gen. & sps. of Phaneropterinae from Eastern Peru (Tettigon). [Notulae Nat.] no. 150, 7 pp., ill. **Roonwall, M. L.**—New hypothesis for prediction of the swarming of the desert locust. [22] 35: 391–93.

HEMIPTERA—Blanchard, E. E.—Descr. y anotaciones de afidoideos Argentinos. [Acta Zool. Lilloana] 2: 15–62, ill. (*). **Caldwell, J. S.**—Notes on some less common genera of tropical Cixiidae. [43] 44: 252–54, ill. (*). Gen. Cedusa in Mexico & C. Amer. (Fulgorid). [102] 3: 445–62, ill. (*). **DeLong, D. M.**—Nomenclatorial notes on Cicadellidae. [43] 44: 272. Some n. sp. of Cloanthanus (Cicadel) from the U. S. [43] 45: 22–28, ill. **Hsiao, Tsai-Yu**—New plant bug from Peru with a note on a new genus from N. Amer. [10] 47: 24–27, ill. **Knull, D. J.**—Descriptions of six Typhlocybas from the U. S. (Cicadel). [43] 44: 269–71, ill. **MacGill, E. I.**—(See under physiology.) **Metcalf, Z. P.**—Bibliography of the Homoptera Auchenorhyncha. Vol. 1 & 2. [N. Carolina State Coll.] Author list, 888 pp., Journals & topical index, 186 pp. **Sampson, W. W.**—Additions to the Aleyrodidae of Mexico. [102] 3: 437–44, ill. (*). **Trautman, M. A.**—Ovipositor studies of the leafhopper genus Erythroneura (Cicadel). [43] 44: 265–68.

LEPIDOPTERA—Bayne, A. F.—Ejemplar anormal de Colias lesbia. [101] 2: 63, ill. **Bourquin, F.**—Observaciones complementarias sobre la metamorfosis de Eurota igniventris (Euchromiid). [101] 2: 27–30, ill. **Breyer, A.**—Algunas observaciones de migraciones de lepidopteros en la Rep. Argentina durante la primavera de 1943 y verano de 1944. Ejemplar anormal de Eurota jorgenseni. [101] 2: 45–49, ill.; 64, ill. **Bridarolli, A.**—Lepidopteros anormales. [101] 2: 31–33, ill. **Dillon & Dillon**—Giant moths of Berks County, Penna. (Saturnid). [Leafl. Mengel Nat. Hist. Soc.] no. 2: 12 pp., ill. **Lange, W. H.**—Autographa egena, a periodic pest of beans in Calif. [55] 21: 13. **Schade, F. H.**—Tres. nuevas Nymphalidae del Paraguay. [Rev. Soc. Cien. Paraguay] 6: 3–4. **Stehr, W. C.**—Notes and records of lepidoptera in Ohio. [43] 45: 18. **Tilden, J. W.**—Notes on some moths of the fam. Saturniidae. [55] 21: 32–33. **Williams & Hayward**—Hesperiidarum rei publicae aequatoris catalogus. [Acta Zool. Lilliana] 2: 63–246. **Wind & Clench**—Notes on the gen. Thaumaina (Lycaenid). [55] 21: 14–16 (*).

DIPTERA—Blanchard, E. E.—Dallasimyia bosqui, n. gen. y sp. de triquiopodino (Gymnosomatid). [101] 2: 7–11, ill. (S). **Camras, S.**—Further notes on some sps. of Zodion (Conopid). [55] 21: 31. **Dampf, A.**—Notas sobre flebotomidos mexicanos. [35] 5: 237–62, ill. (*). **Roth, L. M.**—Male and larva of Psorophora horrida and a n. sp. of Psorophora from the U. S. [10] 47: 1–23, ill. **Stone, A.**—A new sp. of Aedes from Saipan and the larva of Aedes pandani. [10] 47: 65–69, ill. **Wainwright, C. J.**—(See under General.)

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